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New Electrochemistry-Based Approaches to Brandy Quality Evaluation Using Antioxidant Parameters

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Abstract

© 2014, Springer Science+Business Media New York. The electrochemical approaches based on coulometric titration, differential pulse voltammetry (DPV), and chronoamperometry have been tested for applicability to evaluation of brandy quality. The antioxidant properties of samples have been considered as markers of adulteration. Total antioxidant capacity (TAC), ferric reducing power (FRP), as well as ellagic acid equivalent antioxidant capacity (EAE AOC) have been evaluated for ten samples five of which have been recognized as adulteration by gas chromatography. Electrochemical data for adulterations and brandies are significantly different. TAC and FRP values for all adulterated samples are approximately the same (10 ± 3 and 6 ± 2 C/100 mL for TAC and FRP, respectively) while brandies show TAC in the range of 24–108 and FRP of 20–88 C/100 mL depending on denomination and origin. DPV profile of adulterations is strongly different in comparison with brandy (the required peaks are absent and irrelevant peaks are appeared), allowing sample discrimination. Addition of vanillin-containing flavoring agents has been confirmed. The corresponding EAE AOC of brandies is 8–15-fold higher (depending on denomination) than that for adulterations. Two adulterations did not show EAE AOC, reflecting the absence of aging step during beverage production. Chronoamperometric EAE AOC equals to zero for four investigated adulterations. Standard antioxidant parameters antioxidant activity and total phenolic content can be applied for the preliminary screening only. These parameters are ineffective for adulteration of the beverage age using oak extracts. Electrochemical methods developed are characterized by simplicity, cost-efficiency, and reliability of results and can be successfully applied for the brandy quality control.

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Keywords

Antioxidant capacity, Brandy, Chronoamperometry, Constant-current coulometry, Food quality, Voltammetry